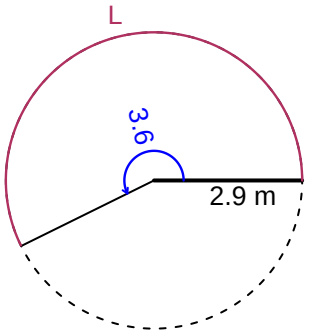
Name: Date:

Trig Final (SLTN v680)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 2.9 meters. The angle measure is 3.6 radians. How long is the arc in meters?

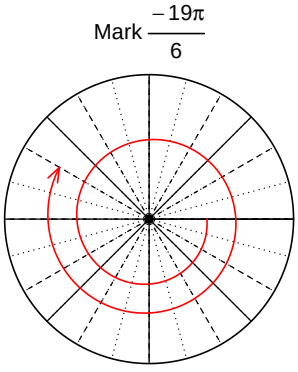


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

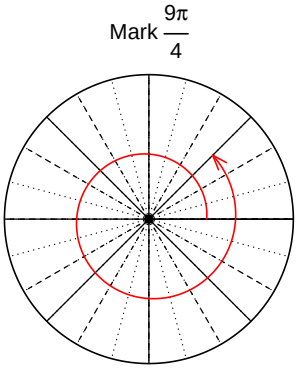
$L = 10.44$ meters.

Question 2

Consider angles $\frac{-19\pi}{6}$ and $\frac{9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-19\pi}{6}\right)$ and $\cos\left(\frac{9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(-19\pi/6)$



Find $\cos(9\pi/4)$

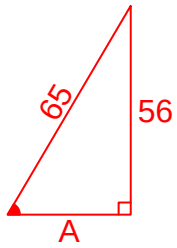
$\sin(-19\pi/6) = \frac{1}{2}$

$\cos(9\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{56}{65}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

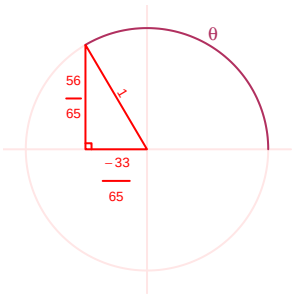
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 56^2 = 65^2$$
$$A = \sqrt{65^2 - 56^2}$$
$$A = 33$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\cos(\theta) = \frac{-33}{65}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 7.61 meters, a midline at $y = 4.31$ meters, and a frequency of 8.88 Hz. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.61\sin(2\pi 8.88t) + 4.31$$

or

$$y = 7.61\sin(17.76\pi t) + 4.31$$

or

$$y = 7.61\sin(55.79t) + 4.31$$